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Immediate Water Pollution Control Needs, Sabine River Basin, Texas and Louisiana

Federal Water Pollution Control Administration, Dallas, Tex

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PB 266 382

IMMEDIATE WATER POLLUTION CONTROL NEEDS

SABINE RIVER BASIN

TEXAS AND LOUISIANA

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTH CENTRAL REGION
DALLAS, TEXAS 75202

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The purpose of the report is to focus attention on known sources of pollution in this area and to provide a priority for action to correct existing problems and to prevent future problems.

17. KEY WORDS AND DOCUMENT ANALYSIS

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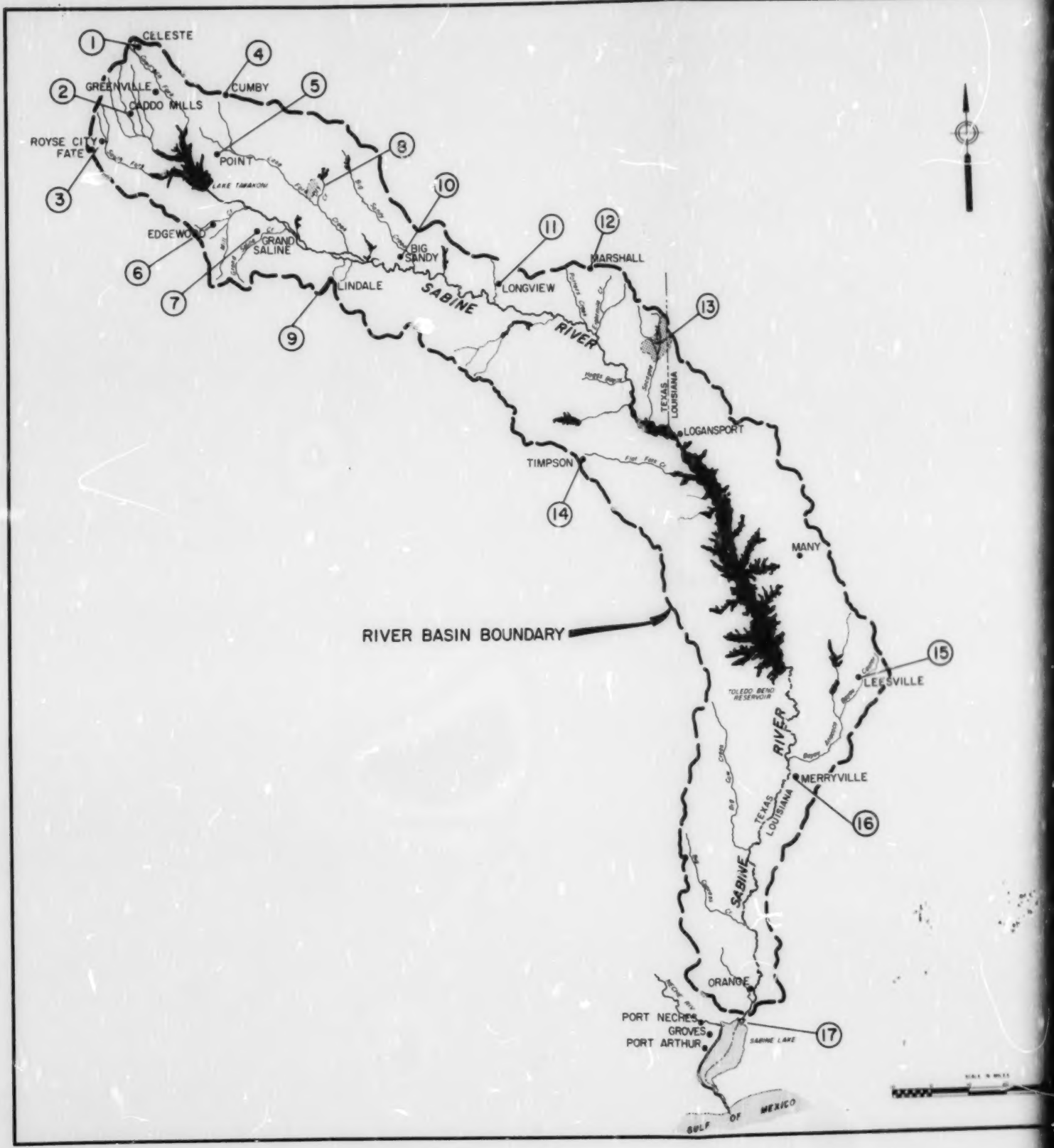
I. Introduction

The purpose of this report is to focus attention on known sources of pollution and to provide a priority for action to correct the existing water pollution problems and prevent future problems in the Sabine River, see Figure 1, an interstate stream and its tributaries. This report is based on compilations of available data of the Federal Water Pollution Control Administration, South Central Region, and the pollution control agencies of Louisiana and Texas. No detailed water quality surveys or engineering studies were carried out for the preparation of this report.

The findings of this report are based on the best information available at this time on water quality conditions and immediate and potential pollution abatement needs. The omission of any particular town, industry, or other establishment from this report does not imply that an immediate or potential pollution abatement need does not possibly exist in that particular area. Priorities listed are based solely on an evaluation of the Sabine River Basin and not on a relative basis with other basins in the South Central Region.

Authority is given in Section 3 (a) of the Federal Water Pollution Control Act, as amended, for the preparation or development of comprehensive programs for eliminating or reducing the pollution of interstate waters and tributaries thereof and improving the sanitary conditions of surface and underground waters. This report, by describing the immediate needs for controlling water pollution in the Sabine River Basin, represents the first step in the development of a comprehensive program to control water pollution in this basin.


1
CELESTE
2
GREENVILLE
CADDO MILLS
3
ROYSE CITY
FATE
4
CUMBY
5
POINT
LAKE TAWAKONI
6
EDGEWOOD
7
GRAND SALINE
8
9
LINDALE
10
BIG SANDY
11
LONGVIEW
12
MARSHALL
SABINE RIVER
13
TEXAS
LOUISIANA
LOGANSPORT
14
TIMPSON
MANY
RIVER BASIN BOUNDARY
15
LEESVILLE
TOLEDO BEND RESERVOIR
MERRYVILLE
16
SABINE RIVER
TEXAS
LOUISIANA
ORANGE
PORT NECHES
GROVES
PORT ARTHUR
17
SABINE LAKE
GULF OF MEXICO

LEGEND

(1) NEEDS

(15)
SVILLE

IMMEDIATE WATER POLLUTION CONTROL NEEDS
SABINE RIVER BASIN-TEXAS AND LOUISIANA

LOCATION MAP

UNITED STATES DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTH CENTRAL REGION APR 1967 DALLAS, TEXAS

FIGURE 1

II. Summary of Immediate Pollution Control Needs

Pollution problems in the Sabine River Basin, as indicated by septic conditions, high chloride concentrations, oxygen depletion, and low pH, result in degradation of aesthetics, damages to propagation of fish and wildlife, municipal and industrial water supply, recreational uses, irrigation, navigation and power generation. The immediate pollution control needs are listed in the following tabulation and grouped into categories: municipal and industrial, natural, oil field, and institutional practices. Location designations refer to Figure 1.

Location	Responsibility	Need	Priority
Municipal and Industrial			
1	City of Celeste, Texas	Secondary treatment	B
2	City of Caddo Mills, Texas	Primary & secondary treatment	A
3	City of Fate, Texas	Primary & secondary treatment	B
	City of Royse City, Texas	Primary & secondary treatment	B
4	City of Cumby, Texas	Primary & secondary treatment	B
5	City of Point, Texas	Primary & secondary treatment	B
6	City of Edgewood, Texas	Secondary treatment	B
9	City of Lindale, Texas	Enlargement of existing facilities	B
10	City of Big Sandy, Texas	Primary & secondary treatment	A
11	City of Longview, Texas	Enlargement of existing facilities	A

Location	Responsibility	Need	Priority
Municipal and Industrial (Continued)			
12	Atlas Chemical Industries, Inc. Marshall, Texas	Treatment of chemical wastes	A
14	City of Timpson, Texas	Additional treatment facilities	B
15	City of Leesville, Louisiana	Enlargement of existing facilities	A
16	City of Merryville, Louisiana	Collection system; primary & secondary treatment	B
17	West Orange WCID #2, Texas	Secondary treatment	B
	Navy - Texas Group Atlantic Reserve Fleet, Orange, Tex.	Connect to City of Orange sewerage system.	B
	City of Port Neches, Texas	Enlargement of existing facilities	A
	Jefferson Co. FWSD #1, Texas	Primary & secondary treatment	B
	City of Port Arthur, Texas	Enlargement of existing facilities	A
Natural			
7	FWPCA	Evaluate subsurface injection of brine	B
17	FWPCA, Corps of Engineers in cooperation with States of Louisiana & Texas	Construct a mathematical model of Sabine Lake and the related Gulf of Mexico to more accurately determine fresh water inflow requirements and the effects of salt water barriers on salt water intrusion	A

Location	Responsibility	Need	Priority
Natural (Continued)			
	Corps of Engineers or Sabine River Authorities	Provide salt water barrier and/or fresh water releases	B
Oil Field			
13	Oil field Operators & Texas Railroad Commission	Reinject oil field brine and improve disposal operations	A
8	Oil field Operators & Texas Railroad Commission	Reinject oil field brine and improve disposal operations	A
Institutional Practices			
Basinwide	States of Louisiana & Texas	Prepare and maintain a complete industrial waste discharge inventory for industries not connected to municipal systems	B
Basinwide	States of Louisiana & Texas	Consider legislation to provide appropriations for State participation in grants for construction of sewage treatment works	B
17	Sabine River & Neches Valley Authorities	Invesigate an areawide sewage collection and treatment system(s) for the coastal area communities in the lower Sabine and Neches River Basins	B
Basinwide	States of Louisiana & Texas	Expand water quality control surveillance program (including treatment plant operation and maintenance)	A
Basinwide	States of Louisiana & Texas	Establish water quality standards	A

III. Immediate Water Pollution Control Needs

Various measures are needed to control existing and potential water pollution of the Sabine River and its tributaries. These measures are needed to abate septic conditions, increase oxygen content and raise pH, and reduce concentrations of chlorides for the protection of water uses within the basin in order to improve and preserve water quality for municipal and industrial water supply, propagation of fish and wildlife, recreation, irrigation, navigation, and power generation.

Although the actions recommended here are not all encompassing, they are prerequisite to good water quality planning and should be included in local, State, and Federal programming for water pollution control. Background for these immediate needs is summarized in Chapter VI.

Municipal and Industrial

Enlarged waste treatment facilities for the cities of Leesville, Louisiana, and Port Neches, Texas, are needed immediately to serve design populations of 20,000 and 14,000, respectively. Longview, Orange, Port Arthur, Caddo Mills, and Big Sandy in Texas, all have plants either under construction or approved for construction with anticipated completion dates in 1967. Construction of these projects should carry a high priority.

Several of the smaller communities need to build, enlarge, or improve their treatment facilities. These communities are Celeste, Caddo Mills, Fate, Royse City, Point, Edgewood, Cumby, Lindale, Timpson, West Orange WCID #2, and Jefferson County FWSD #1. The list of needs is not considered all inclusive and does not reflect projected needs due to future obsolescence or to expanded or changed water uses.

Most of the industries provide some form of treatment for their wastes or have treatment facilities in the planning stages. Treatment of acid and lignite wastes from Atlas Chemical Industries, Inc., in Carthage, Texas, is the only known industrial need and should have a high priority.

Natural

The Federal Water Pollution Control Administration should evaluate subsurface injection of brine discharge from the Grand Saline salt flat as a means of correcting this source of pollution.

The Bureau of Sport Fisheries and Wildlife has made a preliminary estimate of the total fresh water discharge to Sabine Lake from the

Sabine and Neches Rivers required to preserve the fisheries in this estuary, and in the associated Gulf of Mexico. This amounts to a minimum of 1.1 million acre-feet annually, of which the Sabine River should contribute at least 600,000 acre-feet annually. The need could be met by releases from Toledo Bend Reservoir. Also, salt water barriers on the Sabine and Neches Rivers upstream from Sabine Lake to prevent salt water encroachment into the lower rivers are currently under study by the Corps of Engineers. It is suggested that the Federal Water Pollution Control Administration, Corps of Engineers, and the States cooperate in the construction of a mathematical model of Sabine Lake and the related waters of the Gulf of Mexico to more accurately determine fresh water inflow requirements and the effects of salt water barriers on salt water intrusion.

Oil field

Oil field operators and the Texas Railroad Commission should eliminate pollution from oil fields in the Socagee Creek watershed and on Lake Fork Creek (Quitman oil field) by subsurface reinjection and improved disposal operations.

Institutional Practices

To strengthen the States' position on prevention, control, and abatement of stream pollution, water quality standards are needed on intrastate streams. State participation is needed in the waste treatment plant construction grants program to accelerate the construction of needed improvements. Increased surveillance and operation inspection of sewage and industrial waste treatment plants are needed to locate and identify existing or potential serious pollution problems. For more rigid control over industrial pollution and aid in solving complex stream quality problems, a complete and up-to-date inventory is needed of industrial waste discharges to basin streams, listing quantity and quality of effluent and other pertinent data.

Consideration should be given to establishing an authority to investigate an areawide sewage collection and treatment system serving Orange, Beaumont, Port Neches, Port Arthur, and neighboring smaller communities.

IV. Costs

Estimates of the cost of waste abatement measures enumerated in this report indicate that about 7.3 million must be invested in municipal and industrial treatment facilities to correct immediate pollution problems, with 6.3 million needed for projects given a high priority.

In the absence of sufficiently detailed data, abatement costs for natural and oil field pollution were not determined.

V. Recent Progress in Pollution Control

The generally good quality of the waters of the Sabine River Basin is the result of Federal, State, and local water pollution control efforts. Maintenance of this quality is the goal of these agencies, together with abatement of pollution in those areas where problems now exist.

Federal Construction Grants Program

Through the construction grants program, treatment facilities and appurtenant works have been constructed at the cities of Greenville and Groves in Texas, and Logansport and Many in Louisiana, in the past several years. A Federal grant offer has recently been made to construct sewage works at Port Neches, Texas.

State Agencies

The Texas Railroad Commission and the Louisiana Stream Control Commission are carrying on a continuing program of abatement of oil field pollution in the Sabine River Basin. At present, 85 to 90 percent of the brine produced from these operations is injected into subsurface formations. Also, old or abandoned wells are being effectively plugged by the State agencies.

The Texas Water Pollution Control Law was passed in 1961 and became fully effective in November 1962. This law required permits for discharge of any waste waters that may cause pollution. It also provided for the issuance of statutory permits to continue discharges existing at the time of its passage. At present, administration of the law is carried out under a seven-man Water Pollution Control Board. After the Board's initial effort to inventory all existing waste discharges, its major effort has been expended in three areas: Galveston Bay area, oil field brine areas throughout the State, and localized problem areas.

Local Interests

Most of the industries located in the Sabine River Basin provide treatment of their wastes or have treatment facilities in the planning stage. Because reliable information on the individual industries was not available, the more recent action by responsible firms could not be noted.

Sabine River Basin Comprehensive Study

A comprehensive basin study under the auspices of the Water Resources Council is currently being prepared on the Sabine River Basin.

The report is under the direction of a coordinating committee composed of representatives of the States of Louisiana and Texas, the Federal Power Commission, and the U. S. Departments of Agriculture, Army, Commerce, Interior, and Health, Education, and Welfare. The Federal Water Pollution Control Administration is represented on a number of planning committees and work groups and has been responsible for determination of needs for and value of water supply and water quality control storage in Federal reservoir projects.

VI. Background

Pertinent Basin Characteristics

The Sabine River drains an area of about 7,400 square miles in Eastern Texas and 2,300 square miles in Western Louisiana. The basin is crescent-shaped having a length of about 300 miles, and an average width of about 30 miles. It includes all or parts of 20 counties in Texas, and 6 parishes in Louisiana. In addition, municipalities and industries along the coastal area of the Neches River that discharge directly into or immediately above Sabine Lake were included in this study.

Runoff rates in the Sabine River Basin are relatively slow due to the topography and vegetal cover. The long narrow configuration of the watershed, coupled with the lack of large tributaries, permits rapid accumulation of floodwaters. Low streambed gradients occur over much of the river's length. As the river meanders through its flood plain with numerous sloughs, overflow channels, and marshes, slopes of less than 0.8 foot per mile are common.

Population centers include Greenville (21,000), Kilgore (11,200), Longview (45,100), Marshall (25,400), and the Beaumont-Port Arthur metropolitan area (332,000). The major concentrations are located at mid-basin, Longview, and on the coast in the Beaumont-Port Arthur complex.

The study area's primary industry is petroleum production, centered around Longview, with refining and transportation facilities located in the Beaumont-Port Arthur metropolitan area. The petrochemical industry along the coast is a significant segment of the economy of the study area. Manufacturing is important in most areas of the basin with heavy steel works and shipbuilding located at Orange and lighter manufacturing in the north and central parts of the basin.

The surface waters of the Sabine River Basin are generally of excellent chemical quality. Total dissolved solids concentrations range from 100 to 200 milligrams per liter (mg/l), chloride concentrations are generally less than 20 mg/l, and hardness in much of the basin is less than 60 mg/l. Local changes in the quality occur at Grand Saline, Texas, due to a natural brine emission, in Lake Fork and Socagee Creeks due to oil field pollution, and near some of the larger municipalities due to municipal and industrial wastes.

Present Water Quality Problems

In the comprehensive study of the Sabine River and tributaries, a mathematical model of the river system was constructed containing all reservoirs and points of withdrawal and inflow, excluding Sabine Lake. Based on broad organic and inorganic parameters and for the probability of failure level selected, surface waters of the Sabine River Basin are not presently degraded below acceptable limits.

Throughout the Sabine River Basin there are minor problems of water pollution, such as oxygen depletion and degradation of aesthetics, in streams receiving waste discharges from communities having inadequate treatment facilities. This pollution restricts recreational use and propagation of fish and wildlife in isolated reaches in the basin streams. The communities are tabulated in the summary table and are shown on figure 1.

Organic pollution occurs below the coastal cities as a result of inadequate treatment of chemical and petroleum refinery wastes. Information is not available, however, on pollution caused by individual wastes, except in isolated cases. Acid and lignite waste from the Atlas Chemical Industries, Inc., located in Carthage, Texas, is hazardous to livestock, aquatic life, wildlife, and public health in about a 16-mile stretch along Potters and Cold Water Creeks. The Texas Water Pollution Control Board has initiated action to correct this problem.

An area of natural salt pollution occurs on Grand Saline Creek in Van Zandt County. Grand Saline salt dome, which lies near the ground surface, is overlain by a salt flat. Small quantities of highly saline ground waters emerge in the flat and flow into Grand Saline Creek. Spot samples indicate concentrations of chloride and total dissolved solids as high as 39,200 mg/l, and 66,200 mg/l, respectively, in one of the small streams which drains the salt flat. A comparison of the chloride content of Grand Saline Creek above and below the salt flat indicates that the contribution of chlorides to the Sabine River from this source in February 1963 was about 25 tons of chloride per day. These emissions are potentially damaging to municipal and industrial water supply, irrigation, and fish and wildlife propagation.

The encroachment of salt water from the Gulf of Mexico into and above Sabine Lake varies with the inflow of fresh water from the Sabine and Neches Rivers. Salinity gradients in the estuary are complex, the normal gradient pattern being fresh in the upper portions of the lake with the salinity increasing progressively toward the outlet to the Gulf. Water in this area is used for commercial and sport fishing, irrigation, and municipal and industrial water supply.

The chloride concentration is less than 20 mg/l in surface waters for about two-thirds of the Sabine River Basin. In the Lake Fork Creek watershed, streams leaving the Quitman oil field were found to have chloride concentrations as high as 1,020 mg/l. The effect on the main stem of the Sabine River, however, has been minor. Propagation of aquatic life, irrigation, and municipal and industrial water supply have been influenced to a small degree. Oil fields in the Socagee Creek watershed may be contributing brine to surface waters as indicated by chlorides concentrations (88 to 252 mg/l) observed near Carthage.

Large quantities of oil field brines are reinjected into wells in the Sabine River Basin. This practice poses little danger of polluting fresh ground water and surface water supplies provided the following conditions are met: suitable geologic conditions; properly constructed wells; no excessive pressures; proper casing of nearby oil wells, and proper plugging of abandoned wells. The widespread practice of water-flooding in oil fields and the reinjection of oil field brines should be watched carefully.

Analyses for chlorinated hydrocarbon pesticides have been made on carbon adsorption method samples and two grab samples from the Sabine River near Ruliff, Texas, taken between 1957 and 1965. None of the chlorinated hydrocarbons were detectable in the carbon adsorption system samples. In 1964, however, the grab sample was presumed positive for Heptachlor and also Heptachlor Epoxide.

Several relatively minor fish kills have been reported in the study area over the past several years, as shown in Table 1. The principal areas of fish kills are near Marshall and the coastal cities. It should be noted that the increase in kills reported during the last two years may be the result, at least in part, of better reporting procedures.

TABLE 1

Reported Fish Kills in the Sabine River and Directly Tributary Areas of Sabine Lake

Stream	Location (Nearest) (City)	Date	Operations Responsible for Kill	Severity
Sabine River Basin				
Sabine River	Cove Springs	7- -66	Unknown	Moderate
Cedar Creek	Greenville	4- 8-66	Other	-
Rogers Creek	Hawkins	7-20-66	Industrial Operations-Petroleum	Heavy
Sabine River	Marshall	7- -66	Unknown	Moderate
Sabine River	Marshall	11-12-66	Industrial Operations-Mining	Light
Fox Creek	Marshall	5-13-65	Industrial Operations-Petroleum	Light
Sabine River	Orange	8-17-65	Transportation Operations-Barge or Boat	-
None reported in 1963 or 1964.				
Area Directly Tributary to Sabine Lake				
None reported in 1966.				
Neches River	Beaumont	7-29-65	Combination of Industrial Operations	Light
Unnamed Stream	Beaumont	5- 1-64	Transportation Operations-Truck	Light
Cheek Creek	Beaumont	11-27-63	Industrial Operations-Chemical	Light

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